REMARKS

Reconsideration of the application is respectfully requested for the following reasons:

1. Rejection of Claims 8, 10-13, 20, and 22-25 Under 35 USC §112, 1st Paragraph

This rejection, set forth in the first two paragraphs on page 3 of the October 24, 2003 Official Action, has been addressed by:

a. ***amending claim 8 to specify that the components correspond to functions of the optical wave and oversampled complex image*** (the Examiner will note that claim 5, from which claim 8 depends, specifies that the diffracted image corresponds to the diffraction of an optical wave by the oversampled complex image, and that diffraction can be represented by a convolutional product, as described on pages 12-13 of the original specification); and

b. ***amending claim 18 to clarify that the amplitude values depend on the square root of a corresponding value of the real function*** (as opposed to a corresponding value "taken by" the real function–p. 12, lines 4-8 specify that the amplitude distribution of the complex two-dimensional image 81_{nm} is obtained "*by computing for each point of the* [given] *image* 80_{nm} *the square root* ***of*** *the corresponding intensity value*,").

As a result, withdrawal of the rejection under 35 USC §112, 1st Paragraph is respectfully requested.

2. Rejection of Claims 1-25 Under 35 USC §112, 2nd Paragraph

This rejection has been addressed by revising claims 5, 9, 17, 21, to clarify the two passages which the Examiner finds to be confusing, by:

- amending claims 5 and 17 to recite that it is the diffracted image, rather than "production of the diffracted image," that is simulated, and
- amending claims 9 and 21, and the claims from which they depend, to refer to a –combined– rather than "common" image.

So far as the Applicant can determine, the claims are clearly written, idiomatic, grammatical, and in proper U.S. format, and therefore the basis for the Examiner's characterization of the claims as being "generally narrative and indefinite" is not understood. Even the two specific passages alleged by the Examiner to be confusing did not appear confusing to the Applicant or the undersigned (although the passages have been amended to meet the Examiner's objections, as best understood). It is hoped that, if the Examiner continues to reject the claims under 35 USC §112, 2nd Paragraph, she will share some of her expertise and insight and kindly point out the passages believed to be narrative and indefinite, and why they are considered to be narrative and indefinite. While the nature of the errors may be clear to the Examiner, they are not at all clear to the Applicant (or the undersigned).

4. Rejection of Claims 1-4 and 14-16 Under 35 USC §102(b) in view of U.S. Patent No. 4,969,700 (Haines)

This rejection is respectfully traversed on the grounds that the Haines patent fails to disclose or suggest a method or system of producing a hologram of a virtual object, as recited in claims 1-4 and 14-16, which involves the step of computing a set of two-dimensional images representing "the object" (*i.e.*, the entire object) as seen from respective different viewpoints in three-dimensional geometrical space, and computing elementary holograms based thereon. The alleged "two-dimensional" images of Haines result from the use of "windows" 200 or 400 that restrict the field of view of the object to parts of the object, rather than the entire object.

In the April 12, 2004 Advisory Action, the Examiner states that the "window" of Haines "represents a full view of the object not just section or part of it." This interpretation of Haines is incorrect. As explained in col. 6, lines 45-51 and 59-61 of the Haines Patent:

> *The size of the windows and their distance from the object* **define the resulting field of view** *of an object image reconstructed from the hologram so constructed,*

and

> *Each hologram surface grid element then* **sees a restricted field of view** *of the object through the window.*

These passages clearly state that the field of view of the object is defined or limited by the size of the windows. Therefore, the windows of Haines do in fact limit the field of view to part of the object, which makes sense since the windows serve to define the field of view for "hologram grid elements 52 and 54" rather than the claimed two-dimensional images or projections representing the object as seen from different viewpoints. Haines does not start with two-dimensional images of the object from different viewpoints, as claimed, but rather takes the contrary approach of dividing views of the object into grid elements defined by windows, and constructing the hologram from the grid elements.

Nowhere does Haines even remotely suggest that the grid elements seen through the windows are two-dimensional projections, much less two-dimensional projections of the entire object, as claimed. Instead, Haines obtains a plurality of the above-mentioned grid elements 52 and 54 (which correspond to the sampling points 70_{nm} of the present invention) by generating an amplitude distribution of light rays scattered from the object through windows 200 or 400. This amplitude distribution of light rays scattered from the object does not resemble the claimed two-dimensional projections of the object seen from different viewpoints. To the contrary, while the two-dimensional images of the present invention represent a projection of the entire object into a plane, the windows 200 or 400 of Haines only contain the amplitude distribution of a "restricted" view of a part of the object and cannot be said to represent the entire object.

As explained in lines 7-11 of the original specification, the two-dimensional images (80_{nm}) of the claimed invention are obtained by projection of the virtual object on a plane 8, whereby "**each** point 60 of the outside surface of the virtual object 6 visible from the sampling point 70_{nm} is projected onto the second plane 8 along the straight line passing through the point 60 and the sampling point 70_{nm} and in the direction of the sampling point 70_{nm}." Page 11 further reads: "The two-dimensional projected image 80_{nm} is defined digitally by an intensity distribution $f_{nm}(Y,Z)$, in other words, each point (pixel) of the image 80_{nm}, identified by its co-coordinates (Y,Z) in the projection plane 8, is associated with an intensity value which is a real number. As

a result, the claimed two-dimensional images in fact represent a projection of the **entire** object, rather than the views of a part of the object resulting from Haines' use of windows 200 or 400.

Since the method disclosed in the Haines patent never obtains views of "the object" (as opposed to parts of the object), as seen from respective different viewpoints in three-dimensional geometrical space, the Haines patent could not have suggested computation of a set of elementary holograms (90_{nm}), each corresponding to one of the two-dimensional images representing the entire object, and the Haines patent cannot reasonably be said to anticipate or suggest the claimed invention.

5. Rejection of Claims 5-13 and 17-25 Under 35 USC §103(a) in view of U.S. Patent Nos. 4,969,700 (Haines) and 5,668,648 (Saito), and the SPIE article by Michelin *et al.*

This rejection is respectfully traversed on the grounds that the Saito patent and the Michelin article, like the Haines patent, fails to disclose or suggest any steps or means corresponding to the claimed computation of (i) two-dimensional images representing the object as seen from different viewpoints in three-dimensional space and (ii) elementary holograms each corresponding to one of the two-dimensional images, the final hologram being formed by a combination of the elementary holograms computed from the two-dimensional images representing the object as seen from different viewpoints in three-dimensional space.

Instead, the Saito patent is directed generally to use of Fourier transforms to generate diffraction elements similar to those that make up the hologram of Haines, while the Michelin article teaches generally how to use Fourier transformations to compute amplitude transmittance from complex fields representing the reference wave. Neither reference is directed to construction of a hologram from two-dimensional images, much less two-dimensional images that represent the entire object in the manner claimed. Instead, both references teach computational techniques that can be used to perform specific computations involved in the claimed method and system, without including any teaching or suggestion that these steps be applied in the manner recited in claims 1 and 14. Accordingly, withdrawal of the rejection under

35 USC §103(a) in view of the combination of Haines, Saito, and Michelin, is respectfully requested.

6. Double Patenting Rejection

This rejection is respectfully traversed on the grounds that since the Haines patent does not disclose or suggest the claimed set of two-dimensional image data representing the entire object as seen from different viewpoints in three-dimensional geometric space, or a system or method in which the different viewpoint holograms are used to compute a set of elementary holograms from which the final hologram is constructed, the claimed invention does not represent an obvious modification of the calculation process recited in Applicant's U.S. Patent No. 6,344,090. Withdrawal of the obviousness double patenting rejection is therefore respectfully requested.

Having thus overcome each of the rejections made in the Official Action, withdrawal of the rejections and expedited passage of the application to issue is requested.

Respectfully submitted,

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